

**Abstract**

The present invention relates generally to oligonucleotide analogues that include novel protein nucleic acid molecules (PNAs), particularly monomers, dimers, oligomers thereof and methods of making and using these oligonucleotide analogues. The PNAs of the present invention are characterized as including a variety of classes of molecules, such as, for example, hydroxyproline peptide nucleic acids (HypNA), and serine peptide nucleic acids (SerNA). The invention includes monomers, homodimers, heterodimers, homopolymers and heteropolymers of these and other oligonucleotide analogues. The present invention includes methods of using these oligonucleotide analogues in the detection and separating of nucleic acid molecules, including uses that include the utilization of oligonucleotide analogues on a solid support. The present invention also includes methods for purifying or separating nucleic acids, such as mRNA molecules, by hybridization with the oligonucleotides of the present invention. The present invention also includes the use of oligonucleotides of the present invention in antisense and homologous recombination constructs and methods.